

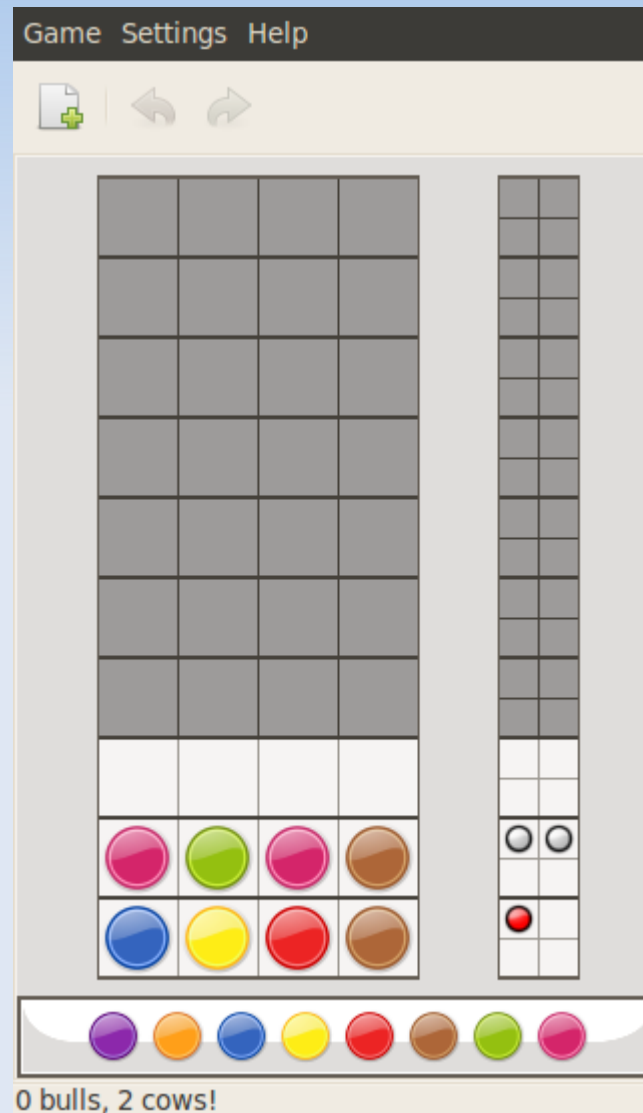
Introduction

- Dave Anders aka prpplague

Introduction

- Dave Anders aka prpplague
- Board Bringup

Introduction



Introduction

- Dave Anders aka prpplague
- Board Bringup
- Codebreaker / Mastermind

Introduction

- Dave Anders aka prpplague
- Board Bringup
- Codebreaker / Mastermind
- Information to cover

Introduction

- Dave Anders aka prpplague
- Board Bringup
- Codebreaker / Mastermind
- Information to cover
 - Schematics

Introduction

- Dave Anders aka prpplague
- Board Bringup
- Codebreaker / Mastermind
- Information to cover
 - Schematics
 - PCB

Introduction

- Dave Anders aka prpplague
- Board Bringup
- Codebreaker / Mastermind
- Information to cover
 - Schematics
 - PCB
 - Assembly

Introduction

- Dave Anders aka prpplague
- Board Bringup
- Codebreaker / Mastermind
- Information to cover
 - Schematics
 - PCB
 - Assembly
 - Scientific Method

Introduction

- Dave Anders aka prpplague
- Board Bringup
- Codebreaker / Mastermind
- Information to cover
 - Schematics
 - PCB
 - Assembly
 - Scientific Method
 - Tools

Introduction

- Dave Anders aka prpplague
- Board Bringup
- Codebreaker / Mastermind
- Information to cover
 - Schematics
 - PCB
 - Assembly
 - Scientific Method
 - Tools
 - Test Case

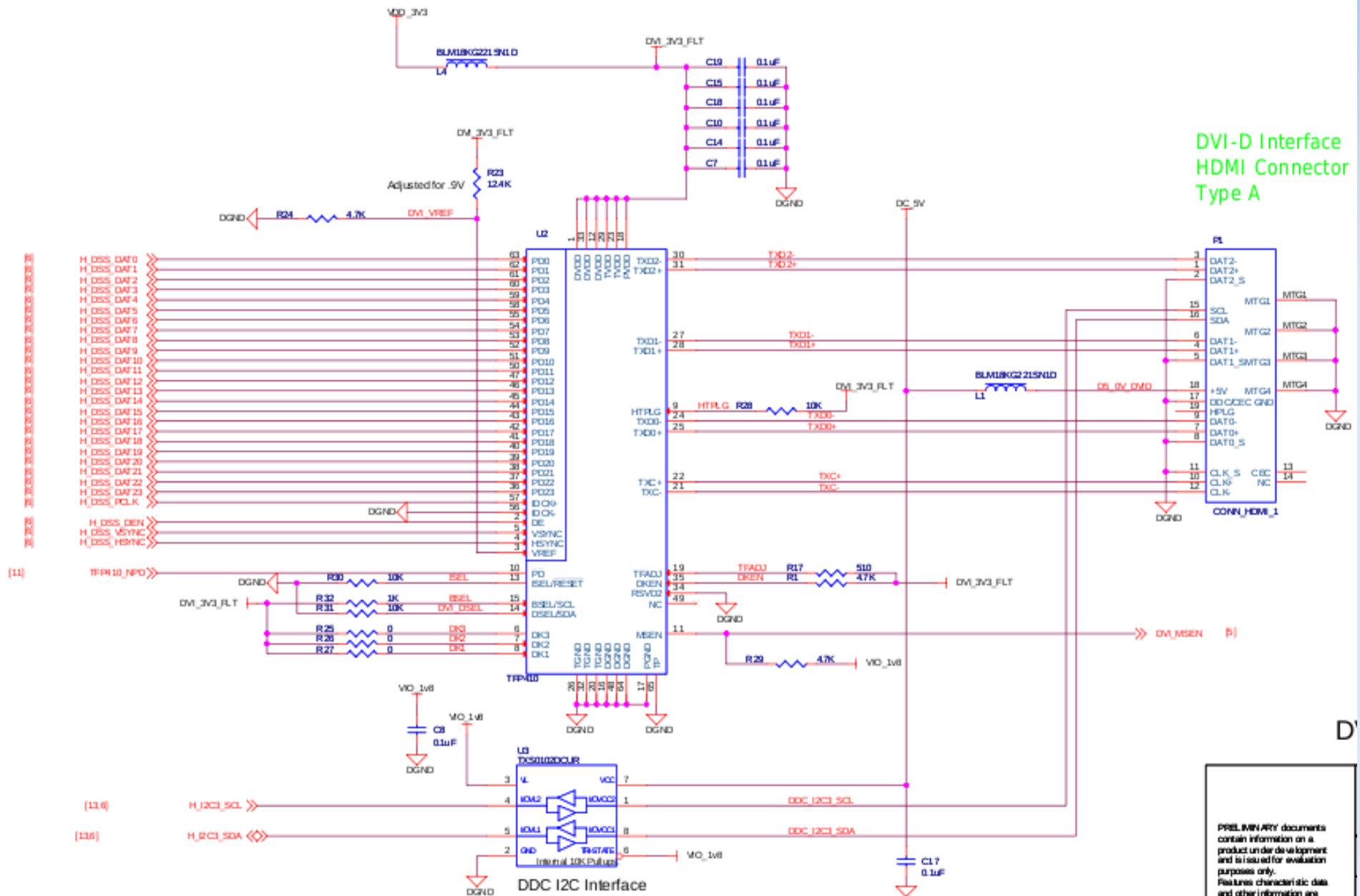
Schematics

- Datasheet Errors and Omissions

Schematics

- Datasheet Errors and Omissions
- Cut-n-Paste is evil

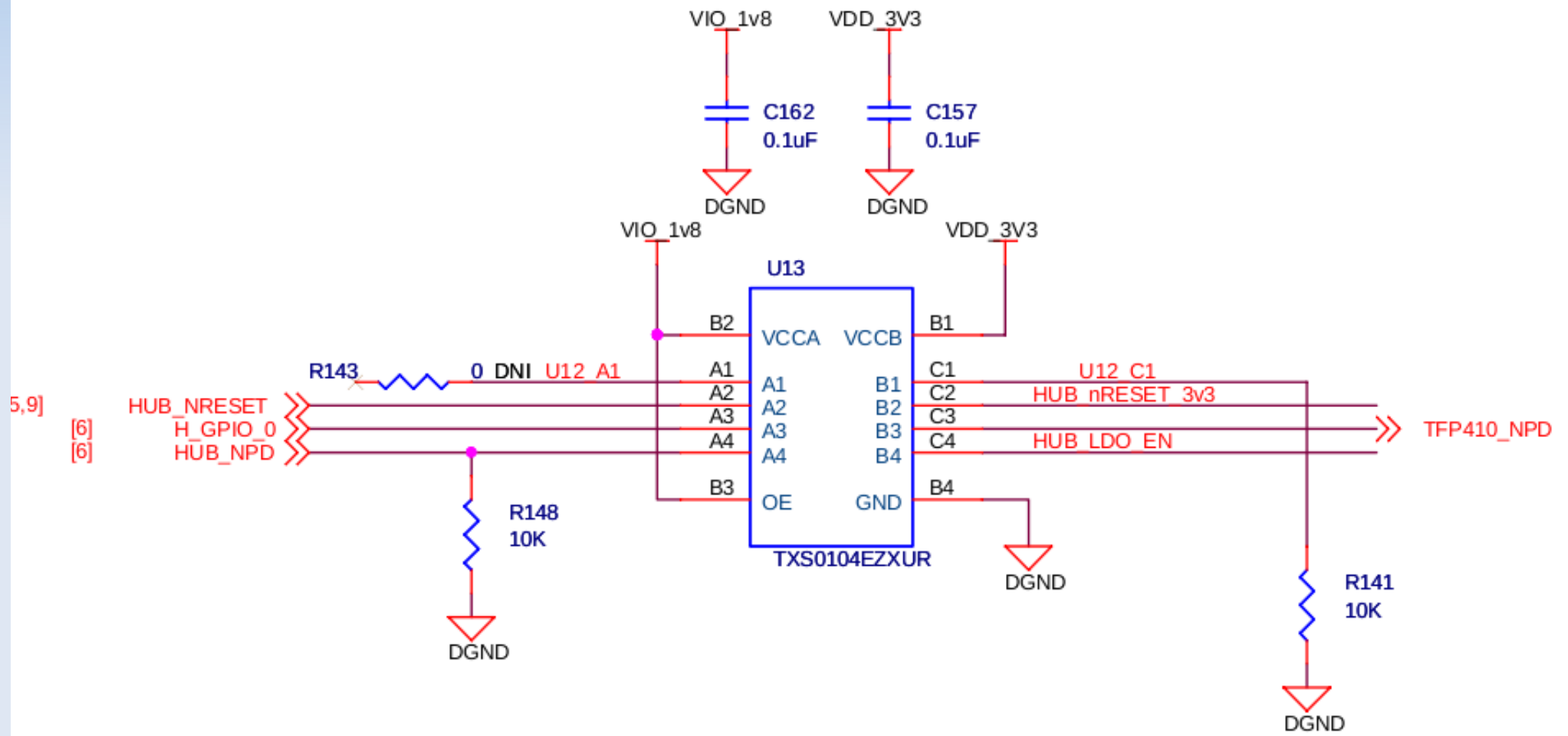
Schematics



DVI-D Interface
HDMI Connector
Type A

PRELIMINARY documents contain information on a product under development and is issued for evaluation purposes only. Features characteristic data and other information are

Schematics

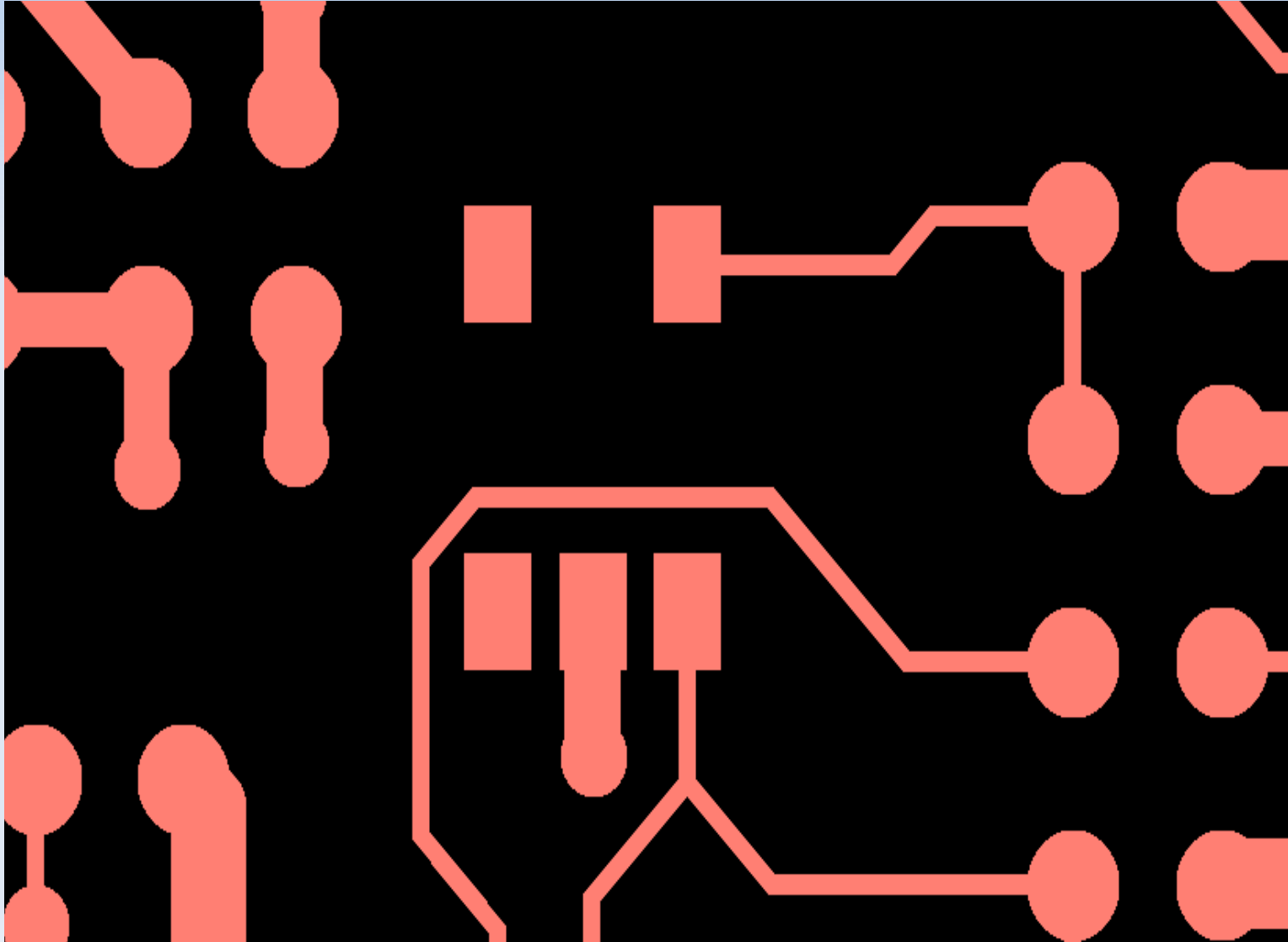


Schematics

- Datasheet Errors and Omissions
- Cut-n-Paste is evil
- Mode and Value Errors
 - 1K vs 10K
 - SPI vs I2C
 - Clock Source
 - Clock Frequency

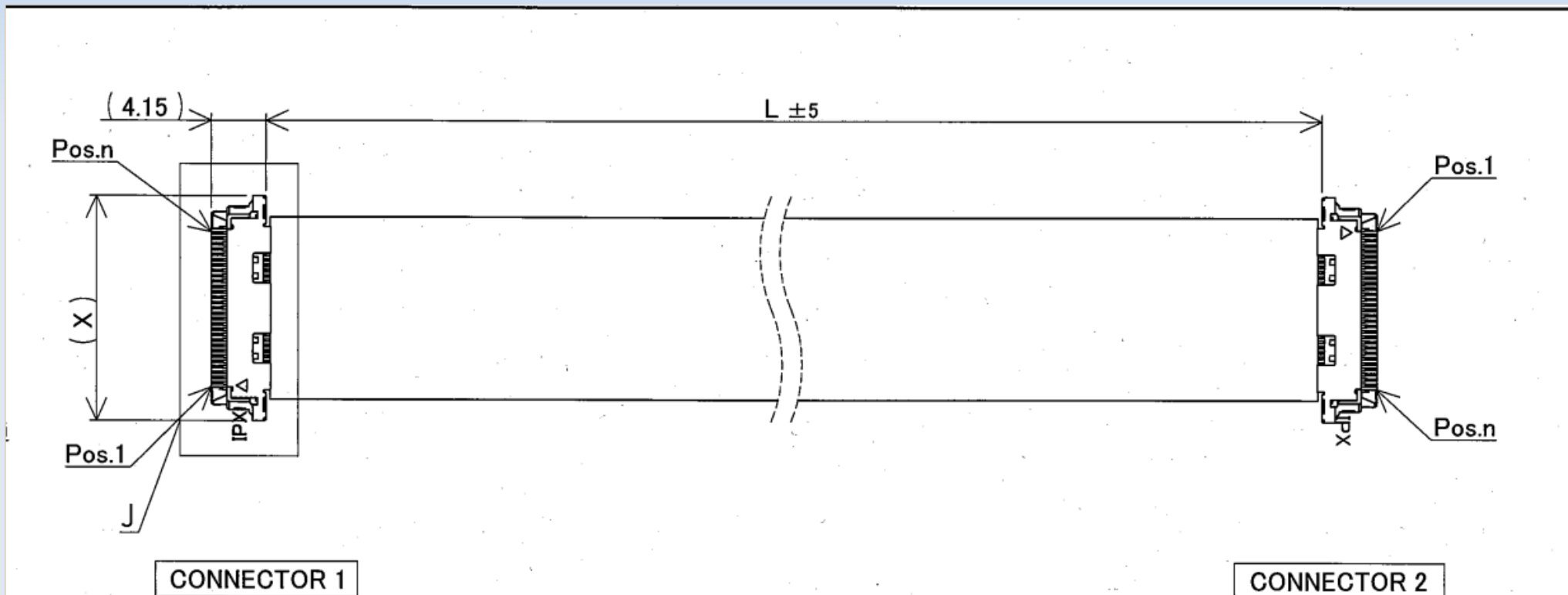
PCB

- Footprint Errors



PCB

- Footprint Errors
- Connector Pin Swap



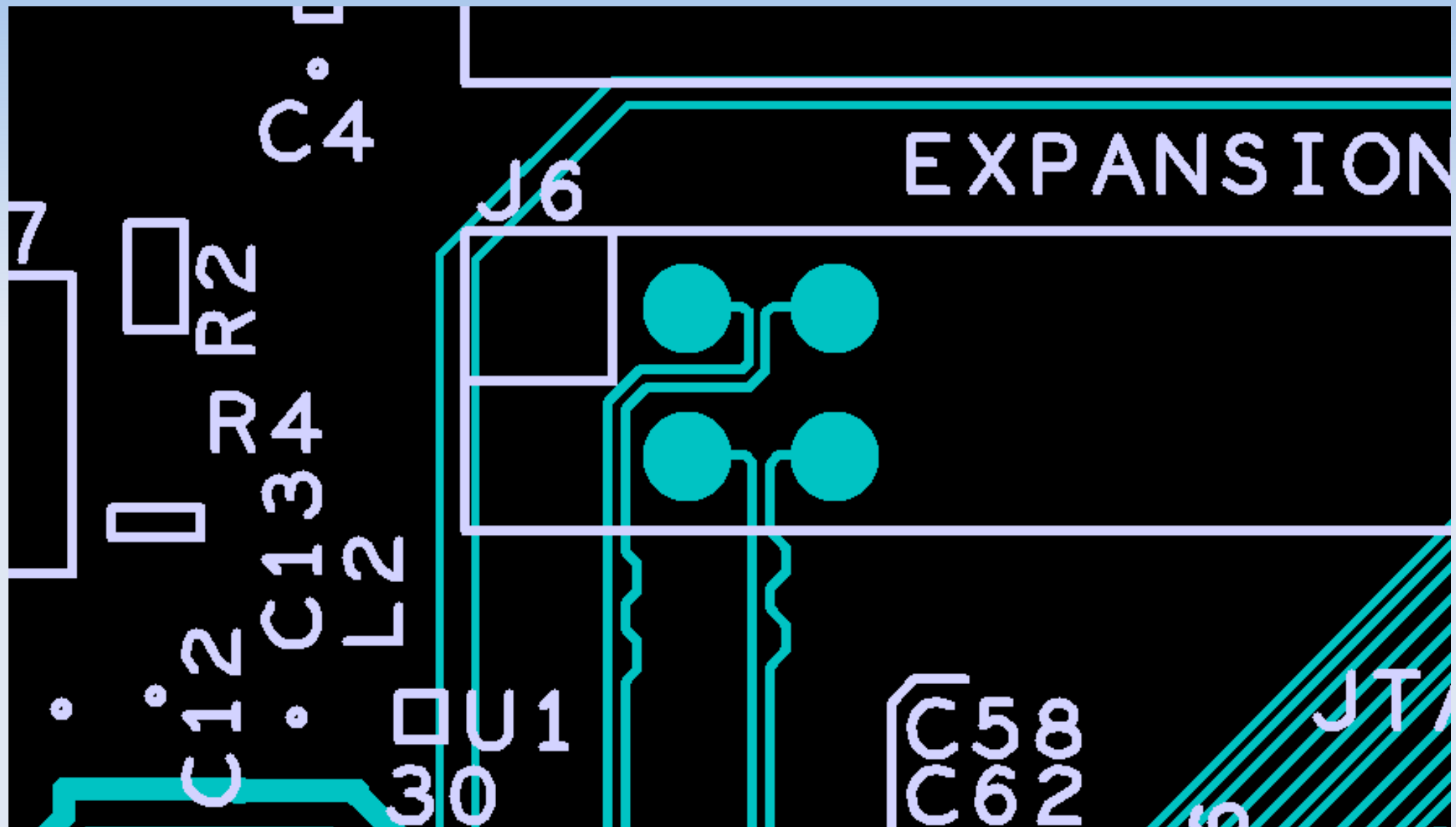
PCB

- Footprint Errors
- Connector Pin Swap
- Back Annotation
 - Ground Pins
 - Voltage Pins

PCB

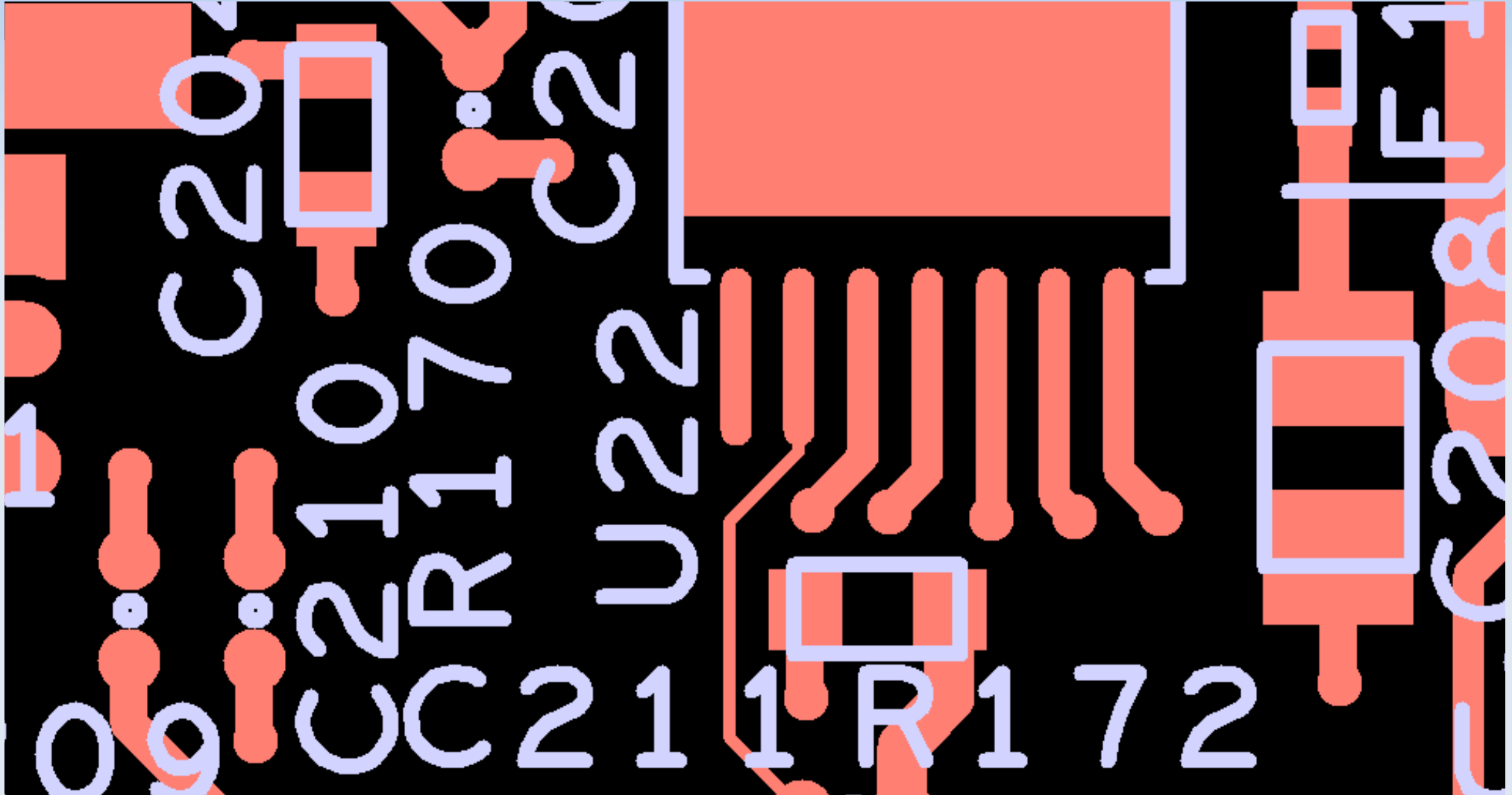
- Footprint Errors
- Connector Pin Swap
- Back Annotation
 - Ground Pins
 - Voltage Pins
 - Signal Polarity

PCB



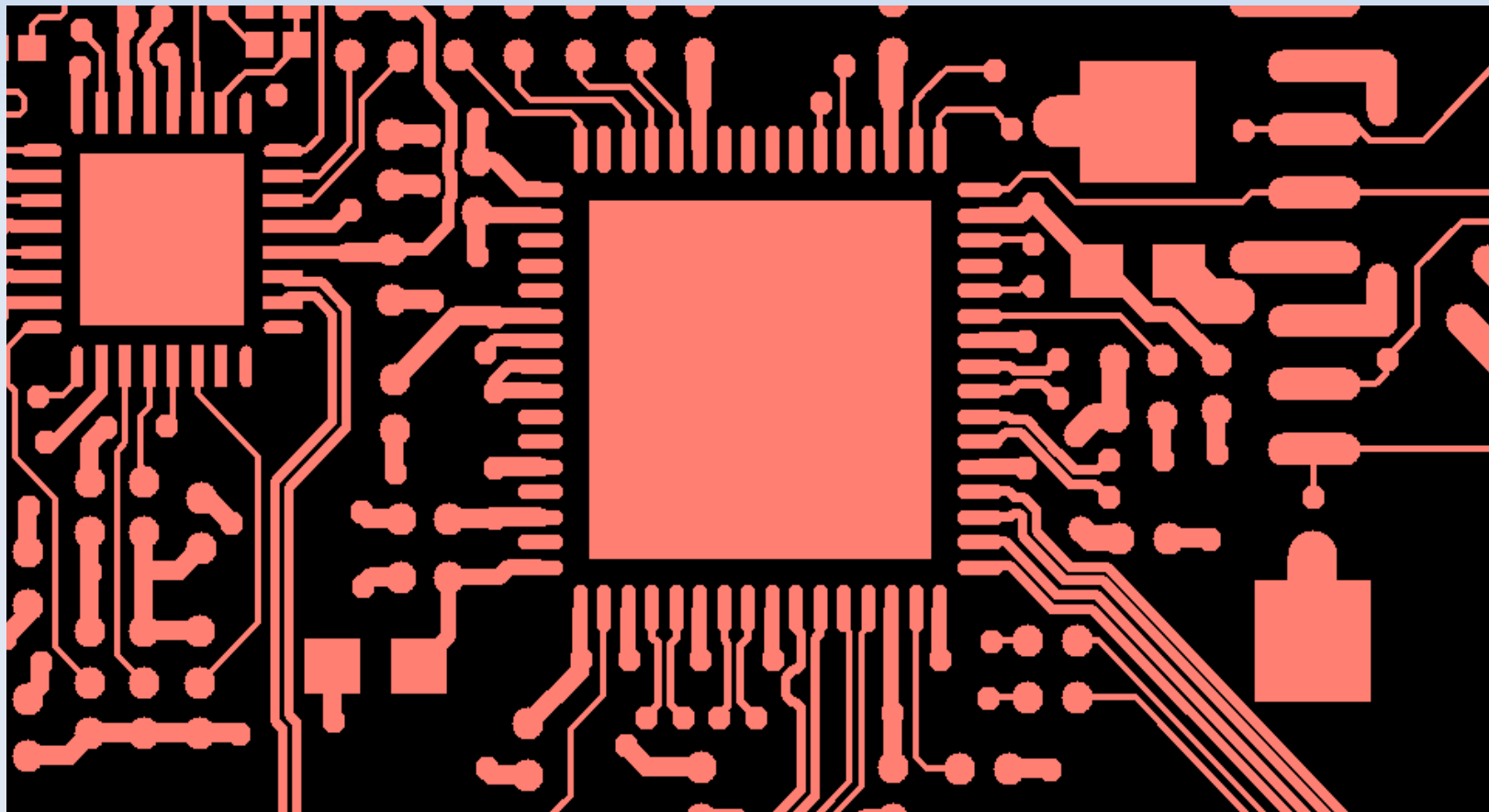
Assembly

- Component Swap



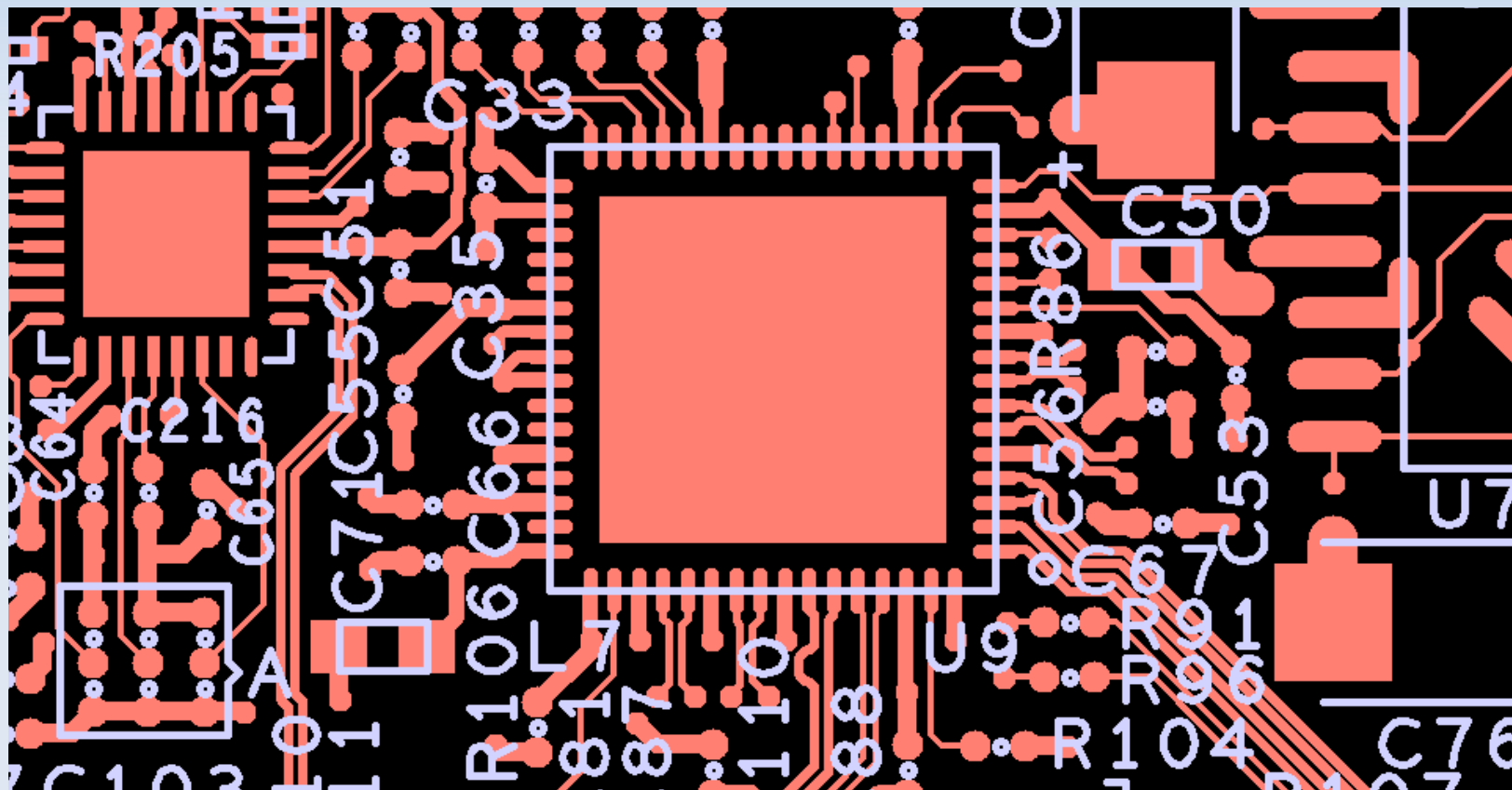
Assembly

- Component Swap
- Component Rotation



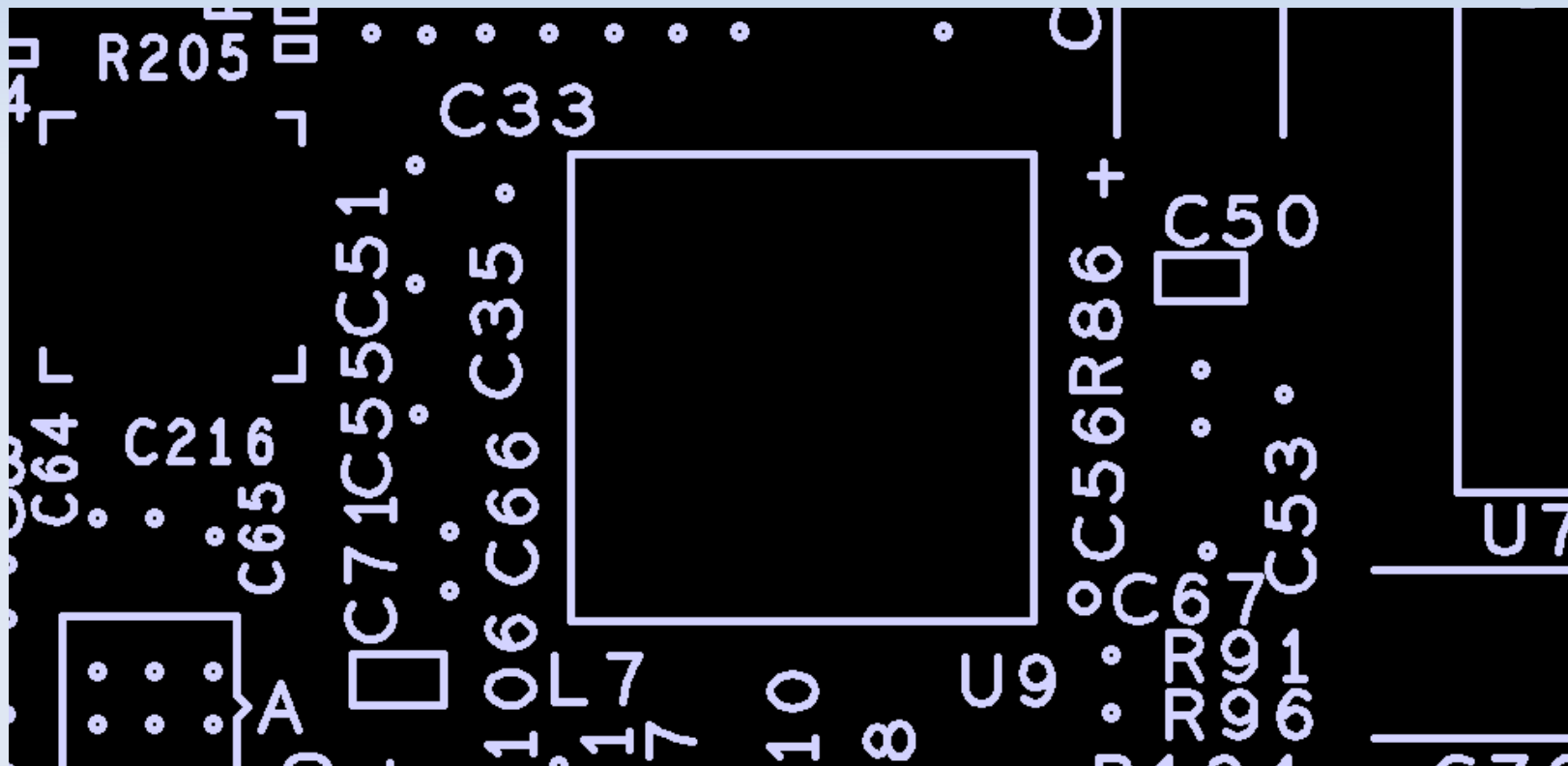
Assembly

- Component Swap
- Component Rotation



Assembly

- Component Swap
- Component Rotation

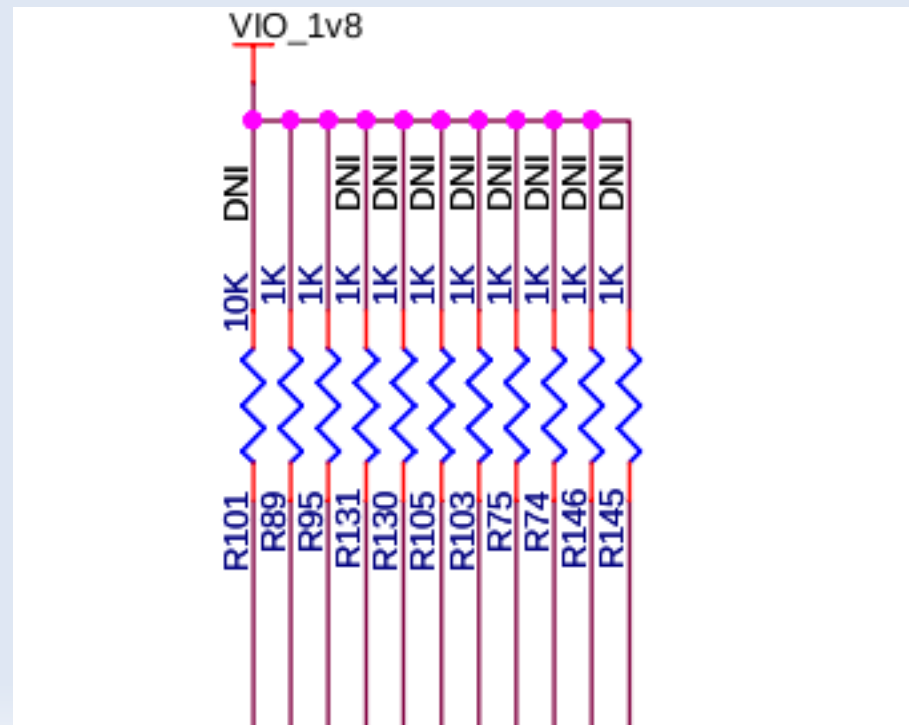


Assembly

- Component Swap
- Component Rotation
- Component Substitution
 - SN75LVDS83 – 3.3V level part
 - SN75LVDS83B – 1.8V level part

Assembly

- Component Swap
- Component Rotation
- Component Substitution
- Do-Not-Install (DNIs)



Scientific Method

- Observe

Scientific Method

- Observe
- Theory

Scientific Method

- Observe
- Theory
- Test

Scientific Method

- Observe
- Theory
- Test
- Analyze

Tools

- Hardware
 - Multimeter
 - Logic Analyzer
 - Oscilloscope
 - JTAG
 - Known Working Devices
 - I2c based eeprom
 - Spi based ADC
 - USB hub
 - Loopback Plugs

Tools

- Hardware
- Software
 - Sigrok – logic analyzer application
 - OpenOCD – on chip debugger using JTAG
 - Gerbv – Gerber file viewer
 - Devmem2 – read/write physical memory address
 - Fb-test – framebuffer pattern test
 - Evtest – reports input events
 - Uart-loopback – uart/spi loopback utility
 - I2c utils – i2c device scan and detection

Tools

- Hardware
- Software
 - http://www.elinux.org/BoardBringup_Uutilities

Tools

- Hardware
- Software
 - http://www.elinux.org/BoardBringup_Uutilities
- Root Filesystem
 - Angstrom console-image via OE

Example Test Case

- Observe – USB devices do not enumerate

Example Test Case

- Observe – USB devices do not enumerate
- Theory – USB PHY is not communicating

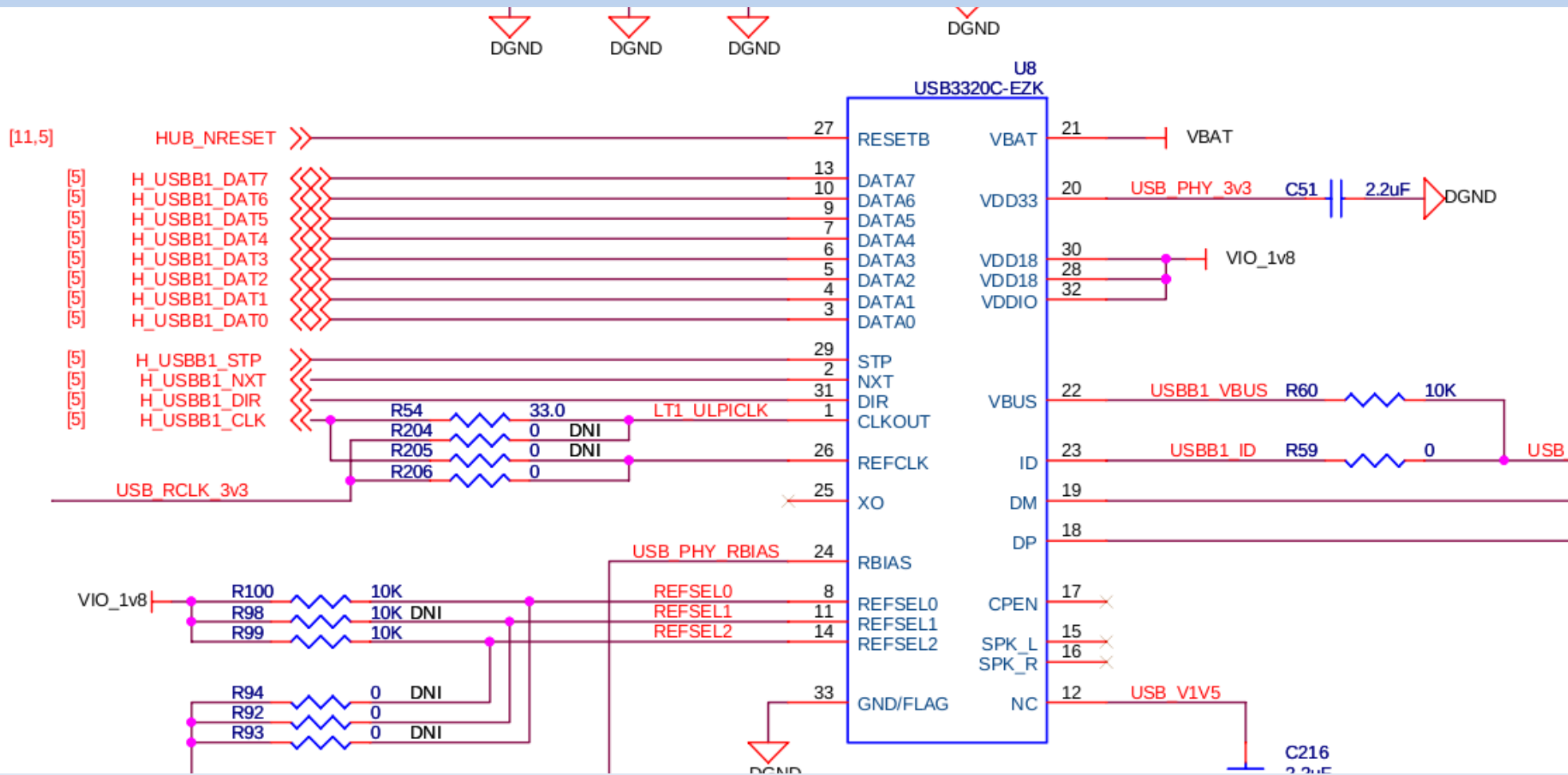
Example Test Case

- Observe – USB devices do not enumerate
- Theory – USB PHY is not communicating
- Test – Use devmem2 to read PHY's ID

Example Test Case

- Observe – USB devices do not enumerate
- Theory – USB PHY is not communicating
- Test – Use devmem2 to read PHY's ID
- Analyze – Failed to read the ID

Example Test Case



Example Test Case

- Observe – USB PHY supports multiple modes
- Theory – USB PHY mode resistors incorrect
- Test – Check physical board and schematic
- Analyze – Found both resistors DNI

Summary

- Common Issues

Summary

- Common Issues
- Scientific Method

Summary

- Common Issues
- Scientific Method
- Open Source Tools

Summary

- Common Issues
- Scientific Method
- Open Source Tools
- Questions?